75016

CRUISE REPORT

R/V ADVANCE II 75-5
and Nekton Beta

22-26 August 1975

D.W. Folger
U.S. Geological Survey
Woods Hole, Mass. 02543

Contents

CRUISE REPORT

Vessels: R/V ADVANCE II; Master:Jordan
DSRV NEKTON ~~DATA~~ BETA: Pilots:Slater, Zahoran, O'Donnell

Cruise No.: ADVANCE II 75-5

Area: Middle Continental Shelf (Baltimore Trough)-U.S.G.S. Stations 4114,4115,4119

Ports: Cape May - Atlantic City, New Jersey

Date: 22-26 August, 1975

Personnel:

U.S.G.S.	Folger, D.W. - Chief Scientist
	Edwards, D.
	Morse, L.
	Purdy, S.
	Cousins, P.
	Rindge, S.
VIMS:	Boesch, D.
EPA:	Reynolds, B.
Westinghouse:	
	Forns, J.

Scientific and Navigation Equipment:

- Loran A
- ORE side scan sonar
- Niskin bottles
- Fitration Apparatus
- Smith-McIntyre gab sampler
- Bathythermographs
- 35mm cameras
- TV

Purpose:

The cruise was conducted to make direct observations of geologic, biologic, and hyrologic conditions at three sites where vibracore pipes and railroad wheels had been placed on the bottom as permanent reference markers. All are located in areas where leasing for oil exploration will probably occur. Though the pipes and wheels had been set in June the specific objective of the dives was to establish geologic and biologic baseline conditions around them. Of primary concern was the magnitude, distribution, and character of ripples on the bottom because they indicate, in part, the extent of bottom sediment mobility.

Data Acquired

Observers on the submarine included U.S.G.S. personnel and biologists from the Virginia Institute of Marince Science, the Environmental Protection Agency, and the Westinghouse Corporation. Aboard the submarine these observers collected both color and black and white 35mm photography and video tapes at each site. They also collected 9 sediment samples from specific localities on the bottom. When the submarine was not in the water other data collected from the ADVANCE II included 39 bathythermograph lowerings, 2 nephelometer lowerings, a series of Niskin bottle casts which resulted in the collection of 9 suspended matter samples, approximately 100 bottom photos, thirteen Shipek and Smith-McIntyre grab samples, and 3 side scan sonar traverses. 74 km

60 km SS
2 nephel
39 BT
9 Susp Ma
13 grabs
100 bottm photos
22 sed sampl total
(9 from sub

Preliminary Results:

At station 4114 observations from the submarine (62 m depth) revealed that the pipe set by the vibracore the previous June was in tact with approximately 10 ft. exposed which was precisely as it had

been set. Thus there was no evidence of significant scour except a small race track depression probably caused by the abundant hake which live around the base of the pipe. Growth on the pipe was starting but it was conspicuously absent at the base, probably because of grazing by hake. Only the pipe and pinger were found; the railroad wheel was not. Caught on the pinger mooring was a giant salp, close to 30 ft. long. Turbidity in the water was usually low but appeared to increase on one dive at 15 meters. Visibility at the bottom was between 9 and 12 meters. The thermocline appeared to start at about 18 meters; surface temperature was 25° and bottom temperature 6.5°C. The current was variable, but on one dive it was definitely from the West probably between 2 and 3 cm per second. At the bottom bioturbation was common. At several localities, ripple marks were clearly evident. Their orientation was generally 210° (T) with a wave length of 30-50 cm, and a wave height of 5-7 cm. In other areas, hummocks and depressions were more common, some of them as much as 50 cm wide, with relief about 6-7 cm. Sediment on the bottom was fine to coarse grained and generally dark to light tan in color. White shell debris, mostly razor clams, was common. It most often concentrated in troughs and depressions and was sparse or absent on crests and mounds. Most of the larger shells were concave up. Common live organisms included small flounders, Caridean shrimp, cancer crab, spotted hake, cyphozoans, sand dollars, and polonices.

Observations from the surface revealed that the top of the thermocline lay between 9-10 m and that surface temperature was as high as 28°C and declined at the bottom to 6.5°C. Bottom photos clearly showed that widespread white shell debris on the bottom concentrated mostly in troughs and depressions. On ridge crests and hummocks, patches of sand dollars were particularly common.

In summary, the bottom at Station 4114 does not seem to be affected by significant currents. The ripples are probably mainly the result of wave action during storms and the hummocks and depressions the result of abundant organisms that live on or in the surficial sediment layer. Little evidence is present for scour or sand build-up around the base of the pipe set in June.

At station 4115, where the depth ranged from 75-78m, the pinger was not located due to an acoustic receiver malfunction aboard the submarine. The thermocline top lay at about 24m with surface temperatures of 26.5°C, dropping to 8.5°C at the bottom. Turbidity was commonly low resulting in good visibility that ranged from 9-11m near the bottom. Currents on the bottom were not strong; a few measurements showed flow from the north at 1-2cm per second. On the bottom, ripples were not common but, when present, were oriented north-south. Hummocks, however, were abundant. The predominant sediment on the bottom was olive-gray, fine to medium grained hard sand. Abundant white shell debris covered the area which consisted mostly of scallops, and sand dollars. Live organisms included common polychaetes with a swollen red end and either a long white trail of mucous material or possibly part of the organism itself. Sand dollars were rare, but scallops, hake, and cancer crabs were common. Bathythermograph observations showed that the top of the thermocline was as shallow as 8 meters where the temperature dropped from 25° down to 7.0° at the bottom. Bottom photos taken from the surface revealed no clear ripple trend but rather the topography observed from the submarine. By far the most abundant macroorganism on the bottom appeared to be the white, red-tipped worms which

crisscrossed the area of every photo. White shell debris was most often fine although some large shells are present.

On one dive site a shoe was observed on the bottom. The top of the shoe had rotted away and the interior that remained was covered with sediment and white shell debris that resembled closely the adjacent bottom. Neither scouring nor burial had occurred. This evidence suggests that the shoe has remained in place for a long time, has not been affected by oscillatory or current water motion, and is, if anything, being filled with sediment stirred up primarily by organisms in the area.

In summary, the bottom seems to be less marked by any kind of oscillatory ripples or any current ripples whatever; therefore, I conclude that the bottom undergoes little turbulence and little motion. The ground-up shell debris is not concentrated by any physical process in any particular locality on the bottom. This area is typified by large wavelength and very high sand waves, with a wavelength of approximately 100-600m. No evidence was observed to suggest that the bottom is in motion or that the waves are in motion; however, because of the scale of the features, only small areas of each wave could be observed with the low visibility in the water column.

On site 4119 where depths ranged from 59-62m, the pipe and the wheel were both located. However, the 7 feet of exposed pipe was bent at an angle of 45° and the railroad wheel nearby tipped over. It appears that either a dragger or perhaps a fisherman intentionally attempted to pull up both pipe and buoy from the attached surface lines. Both buoys that had been attached to them were gone. Submersible observations indicated that the thermocline top was at about 18m. Surface temperature measured in the submarine range from 18.8-24.5° and declined to bottom temperatures of 7-8°C. Turbidity was variable and ranged from low values where visiblity was 8-10m at the bottom to

rather higher values where visiblity was only 3-4m. Currents at the bottom were also variable and ranged from 2-5cm per second from the north and northwest. On the bottom biotrubation was modeate to extensive. In some areas there were few or no ripple marks but only hummocky topography. In others, north to south trending ripples had wavelengths of 30-50 cm and were as much as 10 cm high. These were very sharp symmetrical ripples with abundant shell hash in the troughs. Often the ripples were in a braided pattern with any one crest little more than 2m long. Sediment on the bottom was commonly gray sand, medium to very coarse grained, with scattered, common, shell fragments. In some areas, balls and fragments of dark gray clay were common, although no outcrop of the parent clay bed was observed. Common organisms included sand dollars (mostly located on ridge crests), salps, hake, scallops, crabs, flounders, and shrimp. There was no clear scour around the pipe. However, near the railroad wheel, some of the attached wire was buried by small sand waves. The most striking phenomenon around the RR. wheel was a large population of hake, most of which were larger than any seen in the area or previously on the shelf. Lobster also were burrowing underneath the RR. wheel. Surface observations indicated that the top of the thermocline ranged from about 12-14m; surface temperatures of about 24° declined to 6.7-6.8° on the bottom. Bottom photos revealed an abundance of clay pebbles and some coarse shell debris. The bottom also appeared, in some areas, to be covered by fine material. Most debris concentrated in the depressions surrounding the abundant mounds. Most sand recovered in the grab samples was fine to medium grained with some 2-4 mm pebbles of gray clay. The sand was gray to tan and generally well sorted. Side scan sonar data in the area revealed no pronouced

lineations which was in keeping with observations made from the submarine.

Conclusions

Tentative conclusions indicate that the pipes and railroad wheels do serve as excellent permanent markers for bottom locations of this area of the shelf. The lack of abundant large ripple marks or sand waves suggests that oscillatory motion in the deepest site, station 4115, is not common and that the bottom is not disturbed by much water motion. At the other sites, ripple marks were more pronounced-all appeared to be symmetrical and thus due to oscillatory water motion; thus waves are probably the main source of sediment mobility in these areas of the bottom. The presence of clay particles or clay pebbles in the area of station 4119 suggests that the dark gray clay layer that has been penetrated with the vibracore in the area is close to the surface and outcrops nearby. It may serve as a layer of instability for any structures built on it in the area.

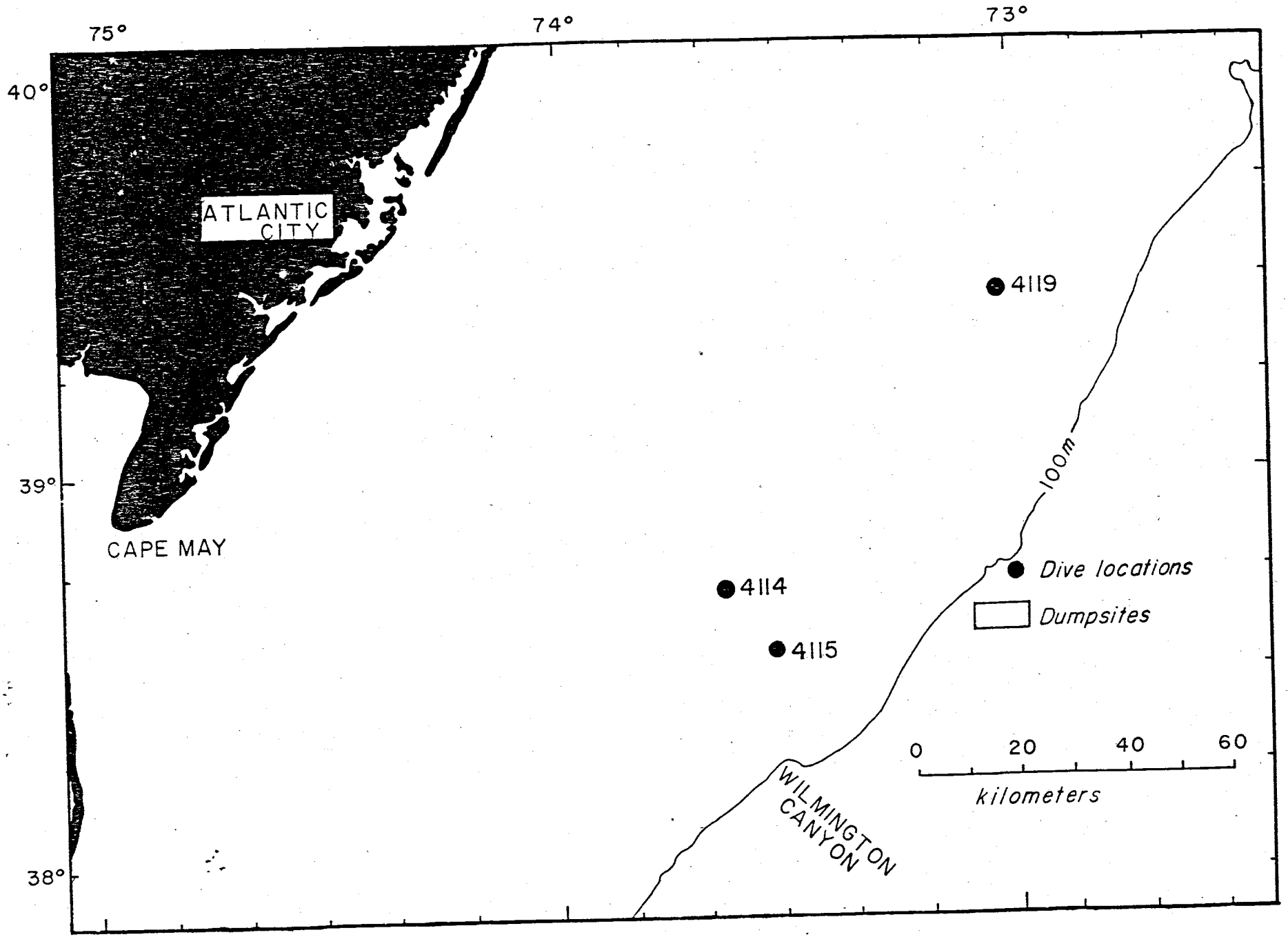

FIGURE I. DIVE LOCATIONS

MID-ATLANTIC

Atlantis II April-June 1975

Sediments		Geophysics	
Vibracores	19	3.6 kHz	12194 km
Gravity Cores	44	Minisparker	2269
Grabs	15	Uniboom	1410
Suspended Matter	50	Airgun	7460
Seabed Drifters	57	Magnetics	8090
Reference Pipes	3	Gravity	10370
R.R. Wheel	3		

Advance II 75-IV & V Aug. 1975

Sediments & Observations		Geophysics	
Dives	23	Side Scan Sonar	104 km
Bottom Photos	350		
BT's	49		
Transmiss	4		
Grab Samples	74		
Suspended Matter	25		

152

104
30
74

includes 30 km from 75-4 ?

TABLE 1

CRUISE SUMMARY

Chief Scientist log, Advance II Cruise 75-5 with Nekton Beta.

21 August 1975

Depart Cape May, N.J. at 2245 for station #114, located about 22 kilometers north northeast of the Wilmington Canyon Head.

22 August 1975

Arrive on station about 0400. Could not find buoy left by Atlantis II. Commenced side scan sonar survey at 0435 in box-search pattern. Could not commence diving because of high winds (30 to 35 knots) and moderate seas. Searched for buoys visually but could not find them. Commenced sonar search and located pinger. Set buoy over the pinger at 1538 and prepared submersible for diving at about 1700. Had to abort dive due to increasing winds and lack of visibility. Collected BT and transmissometer data, Shipek, Niskin, Smith-MacIntyre, samples, bottom photos; conducted plankton tows.

23 August 1975

Conducted plankton tows and collected BT data during the night. Commenced diving at 0930; delayed due to heavy rolling and positioning problems. Pipe located on first dive. Buoy set 50 meters from the pipe. The railroad wheel was not found. Ten feet of pipe were exposed, as set. There was no evidence of scour or significant deposition. Conducted two biologic dives, and one dive to set a new one-year-duration pinger into the top of the pipe. All were successful. Collected 4 Smith-MacIntyre grabs from Advance II. Left the new buoy at the pipe location. Conducted rocking chair dredge: recovered a few scallops and crabs. Bottom covered by sand with moderately abundant shell debris. No well defined ripples were observed. Steamed to station #115.

24 August 1975

Set buoy one half mile northwest of station 115 - no buoys observed or pingers located. Conducted plankton tows and BT lowerings. Commenced side scan sonar survey at 0135; concluded at 0645. Commenced search for pinger at

0730; pinger not located. Commenced diving at 0930. Searched for pinger which was still not located. Collected sediment samples from the submarine. Took still photos and television tape. Neither pipe nor pinger was located on the successive three dives. Diving was terminated due to increasing winds and heavy seas.

Summary of diving: Little wave or current scour observed in the area. Ripples subdued and varied; crests were oriented approximately parallel to 210° T. The bottom is hard sand and appears to be immobile.

Further data collected aboard ship included BT's, plankton tows, transmissometer, Niskin samples, Shipek grab samples (5), Smith-MacIntyre samples (13), bottom photos (35 mm). Secured sampling at about 1030 and started steaming for station 119.

25 August 1975

Arrived on station 119 at 0300. Unable to side scan because of intense line squalls with heavy lightening. Started search for buoys and pingers at 0600. Set buoy on site, located by Loran at 0730. Made detailed search for the pinger within one mile radius of the Loran position; no signals received. Launched the submersible at 1020. Bottom ripple-marked with abundant organisms. Ripples lie 210°, have a 30 - 50 centimeter wave length and are 5 to 10 centimeters high. Located the pinger from the zodia with the sonic receiver on a search around the ship. Located pipe and railroad wheel with Nekton Beta. Railroad wheel turned over, and pipe bent at a 45° angle; probably the result of a bottom dredge, or a vessel trying to pull the two objects up. No evidence of major scour; some of the broken cable, however, was covered by sand, and thus may be evidence for sand wave motion. Conducted BT and Niskin casts; collected five (5) Smith-MacIntyre grab samples; and about 35 bottom photos, (35 mm).

Cruise Summary

The rocking chair dredge was also run.

26 August 1975

Conducted BT lowerings, plankton tows, and side scan sonar survey. Continued diving on station 119 at 0800. Clay pebbles present on the bottom. Photographed the area around the railroad wheel. Assessed the benthic community in the artificial habitat created by the presence of the railroad wheel; fish and lobster common. Placed a new pinger on the old pinger mooring. Diving concluded at about 1400. Conducted BT lowerings and plankton tows. Departed for Atlantic City at 1500 hrs.

Folger 23 August 1975

Side 1

This is dive #463, ADVANCE II, 75-5, 23 August. We're now in the water at 0922. We're clear of the ship, and going on a search for the pipes. Commencing dive at 0925. 0926 - heading down...40 feet, 50 feet - suspended matter increasing. Our cruise plan for this morning calls for photographing the core pipe, scour and so on and then run an some tracks perpendicular to the sand waves for a hundred meters either side of the reference pipe...Passing about 120' - no bottom yet...Bottom coming up - Good descent. Everything looks good. Bottom about to come up...On the bottom at 202 feet - 0927.

Quick description of the bottom-Bottom is definitely rippled; but its quite mottled as well. It's a brown, dark brown, fine grained sand right here - on the surface layer, without doing any digging. Fairly ubiquitously covered by white shells. Much shell debris. A lot of Ensis shells. Sand dollars also. Live crabs. Not too many large shells. There are a few concave up placopecten. Not too many right in view. There's a live scallop and some live starfish.

Now headed 180°, in an attempt to find the pipes...Abundant hake moving around us now. Scallop just came up from down below us. Does not look as if there is really much trend to these ripple marks. If there is any axis, it's southeast (in fact, south/southeast). We're running more or less parallel with some of the features. Although they do have a trend off to our right, somewhat. So, the 210° looks like a pretty good orientation, at this point. We are now flying just above bottom. Most of the hash on the bottom is Ensis shells - very abundant...

Folger (Dive 463) 23 August 1975

Lot of live scallops here. Patches of sand dollars are abundant. No big ripple pattern at all. Relief on the hummocks is about 6 centimeters, 7 centimenters at most...Ripple mark trend is definitely about 30-40^{o} off to our starboard. Troughs are filled with most of the debris, but it's also scattered over the crests. Changing course a little east. Now on heading 150. A lot of salps just off the bottom. There's scallops swimming right along with us and landing upside down. (Signal getting louder)...

First photo - shows a hake right in the middle. A lot of Ensis debris. The hake is approximately 8 inches long. The sand dollars - if they show - are about 1-1/2 inches across, about like a silver dollar. This is a typical pit in the middle of this hummock. Once again, at a different setting - same picture. A number of little red shrimp down here. This sand no longer has that dark brown layering in it when we started. This is a fine, medium grained - fairly homogeneous. A few dark grains in it. Mostly light colored - tan to grey. Sorting is excellent. At this point, in this little trough, I don't see any gravel at all ... (traversing again -) (Sighting of newspaper, again). That was a newspaper, right on the bottom here. Little tiny red shrimp. More live scallops. (Click-photos of scallops). This is as good as the southeast corner of the dumpsite. They are all over the place... some good pronounced ripple marks here. There's an enormous hermit crab. We're heading about 130^{o}. The trend of the ripples is about 110^{o} from that. There's another big crab. Again, we are back in the fluff. Great big starfish. Very large hermit crabs. More hermit crabs than we have seen before. Most of the starfish are feeding. The crabs are getting a lot bigger....Pinger's getting a lot louder.

Did you see that big scallop over there?

O.K. We'll start taking television here in a minute.

Dive #463 - 23 August 75. In the area of the pipes at Site 114. ADVANCE II, 75-5. Littered with shells, mostly Ensis. You can see one of the abundant scallops passing by, and we will see quite a few more as we go here. Bottom life is quite abundant. Many scallops. Quite a few large crabs. Abundant hake. Ripple marks are not particularly well delineated...Sort of elongated humpy topography in which the hummocks are oriented about 210°. Their wave length is in the neighborhood of 30-50 centimeters, and their wave height about 5-7 centimeters. The shells, as you can see, do concentrate in the depressions and in the swales or valleys between the ripples, but never-the-less, there is a lot of white debris that is present over the whole bottom - both crests and trough alike. There's another scallop. We're now in range of the pipe, it's now within 200 years...I'm trying to get as low as I can, to get as much light as possible.

We must be close now. There's a very pretty scallop. White scallops with dark colored spots on them. This may be a different species from the gold colored ones that are so prominent. Still running around 130°, bottom still not really coherently rippled. Running due east at 090. The ripples now are about 100° from us.

(Slater - there's the pipe). Hey look at that. There should be some bright cable on it. Now you can see the foot markers. Can you count them, Rick...(1,2,3,4,5,6,7,8, probably 9)...(1,2,3,4,5,6,7,8,9,10). Perfect, they said they set it at 10, so there's been absolutely no scour whatsoever)...Ought to have a picture of the bottom. (Taking pictures, and having some flash problems)...

Side 2

This is side 2, I hope we didn't miss much, we've been down here looking at the pipe. Very little scour at the base, it's exactly 10 feet in. and we've been looking at the pinger base. The chain is lying on the sand with very little scour around it. Very little change at all. So far, we are unable to find the rail road wheel that's down there. We can't get any ping on it at all. There's an enormous salp hanging on the base of the pinger, which we'll have Don Boesch come down and look at. It's the biggest thing I've ever seen. Must be over 40 or 50 feet long...

The bottom is quite hummocky here. Very little real trend. There's not too much purpose in making a traverse, I don't think, on either side around these pipes. There's just not much evidence that things are being winnowed around here in any coherent fashion. The shell debris is widespread everywhere. Mostly Ensis. It would still would be a good idea to put some kind of buoy on this pipe...

...Let's collect some sediment samples - right around the base of the pipe would be good...This will be good. It will give us a few black and whites here...(taking pictures)... That is that, we are out of film.

We're going to get some grab samples right here at the pipe...base of the pipe, and see what the bottom sediment is...Some barnacles..Beautiful. Let's see where else shall we take one. I really don't see much purpose in taking more than a couple.

The crest of those ripple marks are pretty mobile. It's just like the crest of a dune, which you can push right along. Both bottles were taken right at the base of the pipe, about 1 meter - and the direction must be south of the pipe, right?

1302. We're at 60 feet and we have a temperature of 24°. Can't see too much. In the water column - there's some swimming heteropods. In fact the heteropods seem to be more abundant than indicated in the plankton sample. Some ctenophores, or something like that. Depth 180' - we see bottom - and the temperature is 8-8½°. There's a large array of scalps, several large arrays of scalps. Some scyphozoans.

Now on bottom. There's some skate eggs. The bottom is rippled, but there seems to be no general trend or pattern to the ripple marks. However, in the depressions, there do seem to be congregations of shell material - mostly Ensis, Placopecten and Echinarachnius. Small flounders. They look to be Gulf Stream flounders, scooting on the bottom in front of the advancing sub. Caridean shrimp. There's several of them. Cancer crabs scurring off. The primary orientation of the shells seem to be concave side up. There are scallops sitting on the bottom - gaping. Asterias - looks like; maybe another starfish. The Placopecten seem to be fairly evenly distributed; and I would guess you would find less than 1 per square meter. The Enchinarachnius seem to be in patches and they seem to be predominantly on the sandy or darker elevated areas, rather than in the depressions which are covered with shell. There are a number of scallops there. They still seem to be very evenly distributed though.

There's a spotted hake sitting in the depression. There is a large, Syphozoan. It must be about 6" across and trailing the purple tenacles. Very definitely, the sand dollars are sitting in patches and aggregations on the high spots. There's a scallop that has dug a depression. It seems to be a couple of centimeters deep. There seem to be no marked aggregation of zooplankton, large zooplankton near the bottom, but there are streams, quite numerous streams, of scalp strands. In this fairly broad homogeneous

area there is a lot of heterogeniety, but it doesn't seem to be at all regular. There are quite numerous signs of bioturbation, fecal pellets casting in the light. Placopecten both large and small skipping across the screen. Large Cancer - it seemed to be lifting up a large Echinarachnius. In this area, the primary orientation of the shells is concave side up. Echinarachnius and Placopecten and what appear to be Arctica, but it's difficult to say. Now we just turned the sub lights on and it's amazing how much more turbidity shows up. You see the large suspended particles, chaetognaths swimming among them. These things were not easily visible without the lights. Part of that turbidity seems to be generated by the sub, but there is a fiar amount of suspended matter of large particles near the bottom. There is a very large Polinicies and a red hake. The hake don't seem to be as numerous as I had thought they would be. However, the abundance of life on the bottom, epifauna, is truly amazing. Sand dollars on the high elevations. There's our buoy. The one we put down from the ADVANCE. 5 or 6 concrete blocks - 4 concrete blocks sitting on the bottom, with the line off at an angle, tugging away at the waves.

Already, a starfish has started to climb one of the blocks. Very large placopecten here - mostly in depressions. The asterias here are very abundant. I would estimate one or two per square meter, at least. A small Cancer is walking away from the sub. Closeup view - there is a Polinicies egg case, and there is a large depression - craterlike excavation - it must be about 50 centimeters wide... not like those caused by Placopecten. Right near the stake here is a large aggregation of Echinarachnius - there literally, one on top of of the other. There's hardly an empty space without Echinarachnius. And they are virtually all limited to the high spot. The aggregations of Asterias seem to be 3 or 4 asterias in some cases - must be wrapping a prey.

Sub light off - natural lighting. Quite a bit of light reaches the bottom here. I wouldn't be surprized...whether the typical brownish color which caracterizes the tops of the elevation highs, is in part due to some sort of an algal (?) growth. An amazing amount of light reaches the bottom here.

Doing a traverse about 100 meters long northwest of the pipe. About 6 feet off the bottom, I'd guess. It's a little difficult to see things on the bottom but no large fish are obvious. A pair of red hake sitting on the bottom. While I'm stirring up some material from the bottom, they're congregating around. There's a very large Cancer just sitting, way up on its pereopods in a rather pugnacious manner. Some fairly large Asterias here as well.

The current seems to be moving fairly swiftly past the port. A hake seems to be chasing one of those little shrimp. We tried in vain to secure some samples with our sediment samplers. Two of them are hung up, and didn't fire even after being cut. So we're moving on back to the stake now...I see no signs of Arctica siphons though, could be there. More Arctica clappers. The Placopecten seem to have some brown growth on it. At this distance, it is difficult to say what it is...(Taking pictures).

We're going to cruise past the line connected to the chain which has the large salps strung around it, and I'm going to start taking some T.V. pictures.

Around the area where the stake is I had a look at those salps wrapped around the post. Now we are going to go off in a heading which is perpendicular to our last course. I just completed some video taping and photographs of some hake that we attracted to the sub. There is a very large Placopecten, sitting right out on a hummock. Now in some of the sand areas on the elevations - there is one area right in front of the port here which does not have Echinarachnius on it- there appear to

be scratches on the surface which look like crab tracks or something like that. Lots and lots of Ensis shell fragments scattered around.

Salps passing the port as we cruise a few feet above the bottom. Looking straight down, I see a Placopecten cruising by. There is a very large placopecten in a depression which is about the size of its shell. A very large Cancer - maybe C. borealis. Sort of dug into the bottom. There's a very mottled fish. It's difficult to say what it is from here - small. Large (Polinicies) spread around the bottom. They don't seem to be buried into the substrate at all, but more or less just completely with the mantle, completely extended over the bottom. There's a small skate. Very small, but with spots (Raja oscellata) (clear nosed skate), I believe. Very numberous Placopecten. Small (Pageurus longicarpus, probably) crawling across the screen. Caridean shrimp are all about - sometimes hiding behind shells.

We've cruised about 100 meters from the stake, more or less, on an easternly course. And the bottom here does look a bit different. There is much more shell hash; and there doesn't seem to be as many flat hummocks. Sand dollars seem to be less abundant - Echinarachnius. Seem to be quite a number of starfish around. Preparing to surface now. Time is 1415. And we are on our way up. Depth is 180 feet, and temperature is 6.5°. Depth is 160', temperature 6.5°. Depth is 130'-temperature is 6.5°. Passing 100'-temperature is 7.0°. We're at 20 feet - temperature is 23°. On the surface - 25°.

END OF TAPE

Bruce Reynolds Dive #465 23 August 75

O.K. We're on the bottom. Live sand dollars. Small live scallops. Shell debris and slightly hummocky topography. Some juvenile flounder on the bottom. Some very small shrimp. Quite a few scallops. There's quite a large amount of small shell debris. I've seen a couple of artica clappers. A few scallop shells - some apparently very old. There's also a few polinicies and there's sand collars. Quite a few hake around the anchor...

The stake located in the bottom here has a very slight scour area around it - about two feet in diameter and maybe an inch or two deep, filled with shell debris. It's not unlike other depressions in the area. A skate right ahead here. The sand dollars appear in dense scattered patches - many of them partially buried in the sand. There are numerous Cancer crabs of various size classes. Also there seems to be all sizes of scallops present, from thumbnail size to saucer size. There's apparently noticable current here from the west. However there are no well-defined ripple marks, as such. There are slight depressions and elevations in the order of a few inches, but these are not oriented in any particular way. A lot of the small depressions contain scallops or hake.

There a quite a number of the small red shrimp. Quite a few juvenile flounder - less than in inch long. There are hermit crabs of various sizes, and quite a few asterias starfish - many of which are in the process of feeding. There are many salps in the water column. Around the stake is a very large salp colony - about 12 feet long and about 4 inches wide. Very spectacular. The bottom here is basically sand with shell debris. Some of the shell debris is very finely granulated - broken up. On the trip back to the surface - the water is very clear. The bottom can be seen from at

least 30 or 40 feet away - with the sub lights. Coming up to the surface - the thermocline is also very distinct. The density change is also very apparent, watching the bubbles and the rippling effect by the different density water.

We are underway on dive #467. This is Nekton Beta - aboard the Advance II 75-5. It's the 24th of August, Station 115. The time 1008. Thus far, we have faintly heard the buoy. Our main objective is to find the pinger, and we will be using passive sonor to do so. . . .

Descending - 20 feet. 40 feet - temperature 26.5°, 50 feet - 26.6°. 80 feet - 26.0°. 100 feet - 22°. 110 feet 19.0°. Falling rapidly. The thermocline is deep down here. 140 feet - 10.8°. 150 feet 9.0°. 160 feet - (It's getting warmer - maybe we are getting Gulf Stream water) - 10.0°. 170 feet - 11.1°. 180 feet - 10.0°. 190 feet - 8.5°. 200 feet - 9.0°. 210 feet - 9.0°. 220 feet - 8.5°. Bottom coming up. The depth is 240 feet - 8.5°. On the bottom at 247 feet - temperature stable at 8.8°.

There is little relief down here - it's quite flat. However, there seems to be a trend that goes at right angles to our heading of 270°. So that probably is a minor ripple trend. However, it is completely hummocked. You can see a dark delineation. The bottom appears to be fine grain sand, covered with a darker brown layer of larger material - probably fecal material, by and large. There's abundant shell hash around the area. (Slater - I can hear the pinger - sounds like it is to the south of us). . .

The bottom is covered with a shell hash - fine shell debris. The shell material is generally only a few centimeters across. Abundant Ensis, as before; some white sand dollars - generally small. Some broken scallop shells. There's a beautiful little green eel of some kind. Now under ambient light conditions. . .changing direction to north. . .there are a few starfish. In this view, I only see one large shell in the distance. Everything seems to be pretty well worked, ground up. There are a few parts of what seems to be sea clam shells off in the distance.

Starting to traverse north again. Small starfish; small quahaug shells,

a red snail, a large jellyfish. A lot of burrowing in small symetrical hummocks. Some very small flounder. These little mounds are about 5 centimeters across - 3 or 4 centimeters high. Now we are getting into a field of somewhat larger shells - large, old-looking scallop shells. Certainly not much evidence of scour down here, or sand movement. We are now in an area almost completely covered by the dark brown layer - sort of fluffyish layer. You really can't perceive much relief. Many shells are concave up, but an equal number are concave down. Small flounder again. Topography is getting a little rougher in here. The relief was only a few centimeters when we started. It's now increasing. It looks mostly like bioturbation. Another one of those tiny flounder. There must be a lot of them - we are picking them up very often. It's hard to tell if there's some major relief here - there may be a slope to the east - perhaps a large sand wave.

The currents going rather slowly from north to south. Unfortunately, we are running right into the current, but it isn't very strong. I wouldn't say more than a centimeter a second. Mottely brown coating on the grey bottom. What's interesting is that there isn't very much evidence of very fast oscillatory motion - just very poorly developed physiography. Shell hash is now increasing. There's still not much trend to it. Some shells are at angles in the bottom.

Now, we are getting into a much larger shell debris area. Open scallops. Still a rather mottled pattern on the bottom.

(Turned off tape again). Now we're underway again. Still no pinger. Thought we had it, but we didn't. Fair amount of plankton down here in this water. Not too dense, but a fair amount. Visibility is about 9 meters. Here comes first hake.

Ripple marks possibly lying east/northeast trend - but very low, There's not much to them. . .(Slater - there's a shoe). . .I'll get a picture of it. Well, here we go - a picture of a shoe with a hake looking right at us. Maybe I'd better have a black and white of the shoe. I believe it was a white suede. This certainly will be distinctive for starting off this roll. We can't possibly make a mistake, we're starting with a shoe. That hake is just lying there looking at us. His pupils didn't even dilate. O.K., that's a good picture of a shoe. Doesn't look as if it's moved around, and it's all full of sediment. All kinds of growth in it. It's just sitting there, right on top of the bottom. And it's been here awhile. There's no question about it. The whole top is gone. Yet there it sits, all full of sediment. Doesn't look like anything has happened to it for a long time. There's actually no scour around it, I think I'll get one more. .(click). That shoe is about size 10, double E. Hake looking right smack out at us. He's just not moving around. He's just giving us the eye.

There's a big worm over here. Tube that seems to retract - he's got spots on him and stripes. All kinds of creatures living here. Big quahaug shell off to the right. Fair amount of coarse shell hash.

Looking down a trough, - we're headed approximately north, that is, just due east - it's very low and round. There's as much shell hash on the crest as in the trough. T.V.

Now, ladies and gentlemen, entering stage left is the shoe! . . .

This is dive #467 - 24th of August, 9:45 a.m. We're on the bottom at 248 feet. The most spectacular find here of the day is one SHOE. We are looking at the heel and small hake who is living down there to the right of it; and is giving us the eyeball. The shoe, as you can see, is pretty old.

The top part is gone, and the back split. Unquestionably, an oceanographer's shoe. There's no scour around the shoe, but there's a lot of sediment inside it, as you can see; and quite a lot of growth. Whether the growth is a testimony to the quality of the foot that was in it, or to the productivity of the bottom, remains for the biologist's tested eye to ascertain.

Now our heading is 310, we are heading directly into the current. The current is from the northwest and the velocity crossing our porthole is (about 4 seconds to cross the port) approximately 4 centimeters per second. Ripple marks trend close to 210, northeast - southwest.

I'm going to shoot a few shots beyond the shoe. I'll put the shoe in the foreground, and look out into what looks like a trough. Pretty weak trough. Over to the right now, there's a quahaug shell. It's about 2" across. We have now encompassed within this frame - the trough on the left and the ridge crest on the right. You can see that the shell debris isn't even concentrated that much more in the trough than it is up on the crest. The bottom is just not very impressive. There's quite a few little mounds. You can see some of the mounds in those photographs.

Bottom is still visible at 220. 200 feet - bottom is still visible. We just went by an enormously long worm of some kind. I thought we were going to get a lot of current and a lot of scour around this region, but seems to be wrong. These must be big relic sand waves. 100' - just came into a layer of salps. . . .On the surface at 1102.

END OF TAPE

Don Boesch Dive #468 Station 115 24 August 75

Nekton Beta Dive 468, commencing at 1145. Depth 60 feet - temperature is 26°, dropping fast. 100 feet - tmp. passing 16°. 150 feet - 12°. 180 feet - 8.5°. 200 feet - 8.5° We see bottom. The depth here is about 240 feet. We're fast approaching the bottom. Large suspended particles in the water column, but very good visibility. We're on bottom - depth reading 249 feet.

The bottom here appears to be a little bit different from the other bottom There's a Cerianthid anemone we just crossed. I see the pink worms that Dave described. They're short pink worms - well, actually they're not worms; they appear to be ophiuriod (?) arms. It is strange how the (proximal part of the arm which is visible is pink, but they sure move like ophuriod arms. Here is a small cancer.

The bottom appears to be, in my view anyway, different than the other bottom. There's an absence of the hummocks with Echinarachnius; and the bottom is just kind of generally strewn with shell debris. There are some (mounds), (fecal castings), or some sort of bioturbated mounds, shell with a hydroid growth on it - but that's sort of sparse. And generally, not as much epifauna, not immediately visible, no Asterias or Placopecten ...(taking first sample here).

(Taking second sample). Thos things I thought were ophuriods, certainly aren't. They happen to be some worms. I'm trying to capture one.

Thie first sample we took was just a general sediment sample here; and that was Sample #5. This sample has ... or had a little worm in it. I think he got out. Try again. I got a coop full that time...and I see the worm leaving. Try again. Got another scoop full...(strategy and discussion for capturing the worm)...Bottom temperature 8.0°C.

Let me have a close-up look at these animals here. I think they're Polychaetes and the red pinkish part is anterior end and the sort of streamy white part is the posterior end and with fecal matter moving through it...I got a sample!...(taking pictures).

You don't see so many fish and things around here like the other day do you? Even the starfish density seems to be a little less. There's a very interesting gastropod there- a snail. You see it down there, and off my port... The gastropods seem to be pretty abundant here, but you don't see many scallops. (Taking more pictures).

The bottom seems very monotonous. It seems loaded with those worms that Dave talked about - got some in the sample. I don't know what they are...Cerianthids scattered about ...Cancer boreulis. Going up a bit. Bottom...patches still seem to be rather brown. Scattered shell all over the place with no apparent pattern. Large Polinices shell or naticid shell - dead. Overturned placopecten - dead. ... Small squid sitting on the bottom here. Asterias. A few scallops, but very sparse. Small tongue fish sitting on the bottom. Quite a number of cerianthids here. I would estimate there must be 4 or 5 per square meter in some spots. Some of them rather small. There's a Pagurus acadiensis feeding on top of what looks to be a long worm tube. Just grazing sand off the top. Shell debris all over. Hake just swam by. (Taking another sample)... Hake wants to crawl in...Let's see how much I got. Try to get a bit more. I got a gut full that time. Spotted hake keeps following us...

Passing 200 feet and the temperature is 8.0°. Passing 140 feet and the temperature is 8.5°. 100 feet - temperature is 11.0°. At the surface the time is 1223.

END OF TAPE

Nekton Beta, Advance II, 75-5, 24 August 1975. The time is 1318. Commencing dive at the buoy which lies approximately 1/2 mile SW of the actual station location. Make an attempt here to listen for the pinger again; also to assess variability over short distances. The water here is quite blue. Probably the result of an inflow of Gulf Stream water. 80 feet - temperature 25.6°. 90 feet - 24.5°. 100 feet - 24.0°. 110 feet - 22.0°. 120 feet - declining very rapidly, about 19°. 130 feet - 18°. 140 feet - 15°. 150 feet - 14°. 170 feet - 12°. 180 feet - 10.5°. 190 feet - 11.4°. 200 feet - 10.8°. 210 feet - 10.5°. 220 feet - 9.2°. 230 feet - 9.0°. 240 feet - 9.8°. 250 feet. Coming down to the bottom at 255 feet. That's interesting. It was 248 feet on the last one. Part of the goal of dives this station is to see if there is much relief on these big, long sand waves. And so here, 1/2 mile away - we are about 7 feet lower than we were. That may mean we were up on a great big crest. The question is what orientation are we looking at?

We are heading 270 right now. The bottom, as the debris begins to clear, is covered with shells. A lot of these are small. Much Ensis debris. Much small dark grey scallop shell debris. The difference between this and the other locality is the greater abundance of shell material. Again, it is quite random. But, what's interesting is that it's less there and more here, and we're down 7 feet lower. So perhaps there we were closer to a ridge crest. Whereas here, we are looking at one of these big troughs - if we have about 1/2 kilometer wave length.

Most of the shell material appears to be concave up. (No pinging). That big pipe ought to be lying around here somewhere. We'll never find it if it fell over. . .Current still coming out of the north. Very slowly - only about 2 centimeters per second. No question about that flow. It's directly on our beam. I might as well dig up a sample while we're here. I'll get a picture of the bottom first.

This first shot is just going to show a lot of shell hash. That's all. It just demonstrates that it is here. There is a grey, nondescript, shaped piece of material - possibly a piece of placopecten shell. . .That just gives you a pretty good idea of what's down here on the bottom. Took two exposures; one 5.6 and one 8. And so now, we will try and wrestle a sample aboard right here. This bottom is pretty hard. Now have sampler full. Might as well document the site here. . .

T.V.

Dive 469. Nekton Beta 24 August. We're still attempting to find the pinger, and the pipe that was set. And we are now approximately SW of the center of the site . . .This site is somewhat lower by some 7 feet, a little over 2 meters, - lower than the last position. We are probably in one of these troughs based on the greater abundance of white shell debris. The other area might be winnowed a little bit more, We are on a northerly heading now. . parallel to the ripple marks. Let's go north for about 100 yards and then across.

A little bit off the bottom now, so we can get a better perspective on what's going on down there - not going quite as fast. Lighting looks pretty good. Some razor clam shells down there. A few of them standing up. Most of them are small shells, the name of which I don't know. They are about 3/4" across. (Many red worms with a white tail behind them, possibly a slime trail. Small mounds of the burrowing organisms. There's a scallop shell right up on edge - just very little of it sticking in the sand. Aren't many sand dollars here. Looking right down in some little animals burrough.

Sediments are olive-grey, fine to medium grained. Not even minor ripples here. Very mottled and lots of wing. This sand is sort of salt and peppery. You can see the current blow them on by here from north to south - a few centimeters a second. Up ahead is a very large shell. The shadow you see is the

shadow of the claw. The bottom is really featureless.

That looks like a footprint. (Changing direction - West) (Traversing).

Let's set off to the right of that little black thing. This is really a desert right in this area. That's kind of interesting. We actually lost 7 feet going in a northeast/southwest direction. These ripples should lie 210 now. . .We've turned to the northwest for awhile. . .There's a big snail shell. I'm surprised there's not a hermit crab in it; let's head off due east.

Now we're east of the crest. Flying nicely along the bottom. We'll be crossing our own track here in a minute. Topography really looks quite mottled. I don't see any real trend at all. As we proceed to the east, the amount of shell material seems to be sparser. Can't really see what the relief is. Patches where shell material is abundant, and places to where it is quite sparse. Maybe some small ripples here, oriented at right angles to our camera. Very, very small. A few large, white shells, concave up. Lots of shell hash. Very fine material. . .All these cute little snail shells - like a cone, a perfect little cone. I'll attempt to capture him in our sampler.

I better shoot a few more pictures. I'm not intrigued with what I see here. Those little red worms - I suppose someone would say those are interesting. This is a superb shot of a grungy little red worm, which has a little red trail behind him - for what it's worth. Very abundant form of life here. Just outstanding. That's the best picture of a worm I've ever taken. . .This picture will be part of the hole I dug. And it shows very well a greyer fine-grained sand - this stuff is pretty fine. From digging in it, it's pretty tough as well. It's really not kicking up very much debris though, is it? So it's really pretty clean sand. It's hard and pretty tough. It's much harder than the areas where the sand waves are active. The sand waves are very, very soft on top compared to these things.

Here's some black and white's now. This just shows one little shell - a lot of these little wormy things all over the place, but I don't know whether we'll be able to see those with the focus. . .They're just like threads; and they're white, except up at the beginning of them where they're nice and red. Little tiny tube things, with a trail of white behind them. They're all over; the body of the worm is about 3 times the size of the thread.

O.K., going up. We've used a whole reel. Now it's 1305. Beginning our ascent. 250 feet. . .ascending to 200 feet. Coming up slowly. This is really a great little rig. . .Dive #469 at the surface 1411.

END OF TAPE

Station 115 -August 24, 1975. On the bottom at 250 feet. The bottom here is nearly perfectly flat. Very few small elevations and depressions. Scattered, more or less uniformly, with broken shell. We have a few hake. Cancer crabs. There's an occasional scallop swimming along. There's a few Astarte shells. It's not possible to tell whether they are alive or dead. A few flounder. Well, we found a glove here to go along with that shoe. There are many shells that are perfectly conical. I can't think of the name off hand, but it's familiar. There are a few asterias starfish here and there. The bottom is fairly well covered with thread-like polychaetes that have a bright red swollen end. There are also quite a few fan worms with their tentacles extended out of the burroughs.

There's a few hake swimming around, apparently following the sub. Quite a few flounder - especially small ones. There are several quite large Cancer crabs in the area. There are some Spirorbis tubes on the old scallops shells lying on the bottom. Shell debris consists of Ensis, scallops, very few Artica, a lot of small bivalves which look something like cockles. Most of it looks quite old.

O.K. I am digging up the bottom a little bit with the mechanical arm. The freshly exposed sand is a little bit greyer in color than the surface material, which appears somewhat brown. I've excavated a small hole. The material down to about 5" seems to be the same as at the surface. There are a few worm tubes exposed. The rest is greyish sand and shell debris. I didn't uncover any buried shell fish. There are also some Henricia starfish and some crabs that I can't identify. One reddish one with very long forelegs. The bottom is still very flat with a few small bumps and depressions. We've seen a few squid. We're about to surface. Throughout the entire dive, the bottom has remained as previously described.

However, in the last few moments, we have passed some real flat areas of sand which look like they have been scoured clean of shell debris. These are also raised a little bit above the surrounding area. They look like areas of harder more compacted sand that have resisted erosion by bottom currents. We have been experiencing very slight current coming out of the north and setting us to the south a little.

On the way up, we lost site of the bottom at about 35 feet above the bottom. END OF THE DIVE.

This is dive #471, Nekton Beta, Advance II, 75-5, 25 August 75. Time is 1020. We are diving on the final site, 419. We have been unable so far to pick up a pinger signal. Commencing descent. Temperature of the surface water - 18.8°; 30 feet - 18.8°; 40 feet - 18.8°; 50 feet - 18.7°; 60 feet - 18.5°; 70 feet - 16.0°. 80 feet - 15.2°; 90 feet - 14.0°; 100 feet - 14.8°; 110 feet - 10.8°; 120 feet - 9.5°; 130 feet - 8.5°; 150 feet - 9.7°; 170 feet - 7.7°. 180 feet - 7.0°. Bottom in sight. 190 feet - 7.2°. On the bottom at 196 feet. Time is 1023. Visibility - excellent.

First glimpse of the bottom here - ambient light. Headed almost north at 010°. We appear to be almost parallel to the ripple crest, and they're pretty high and sharp. Wavelength looks to be about 30 centimeters - a little more than that, about 30 - 50 centimeters. The height appears to be close to 10 centimeters - very sharp. The debris, lots of fine shell hash in the troughs; coarse shell hash in the troughs, as well as some whole artica shells. Quite a few - more than we saw last time. Hake are very abundant. Four hake immediately in view. There's the most moth-eaten little spider crab down here you ever saw. O.K., we're going to take some photos here. There's an excellent shot of the ripple topography. The shading ought to be just right. First off, black and white, shooting at 8 and 1/60th. Sand dollars are abundant here. Most of them are under the surface. This will give us a good reference, hake right in the middle of the photo. Hake in the foreground now. There's one big artica clapper in the background. . .beautiful salp right here in front of our window. He is just gorgeous. O.K., we're going to try some color now. Three hake in the picture right now. All the hake took off, so the most distinctive thing in the foreground is a big artica clapper shell.

I'll collect some samples. Get one of these ridge crests and then a trough. This is pretty nice right here. There's a big crest. . .soft sand. A lot of hake. Now get out of there, you hake. Look at them all, 7, 8, 9, 10 - the minute I start digging. . .I've got a perfect example of a crest - Can #5, CREST.

TELEVISION

Dive #471, 25 August 75, Nekton Beta on Advance II, 75-5. We're about to collect a good sample of a crest. In my right hand now, I am trying to thread that little loop - I just had it in when we started the T.V. Should be a demonstration of how to do it. Just as I got ready to pull it came out.

O.K., here we are, we're going to try to pop that sampler. We've got a crest sample in it. . .Oh, I'll give it a try, lost it again. It's just hung up at the last part. In fact, I'm in a beautiful position to take a little more sample. So, I'm going to do that. It wasn't that full. . .O.K., I gave you sort of a stop action. I had to use two hands to get it closed, but there you are. Sample #5 right on a ripple crest - station 119.

Pushing the sub along. . .Now, I've got a hake in a classic pose here. Well, this ought to be a pretty good trough. I just scared a big hake right out of the bottom . . .that was a perfect closure. That was so good, I can't believe it. Looks like an eel out there.

What we are doing is listening for the pinger right now. We got a good sample, sample #5 has crest. The other sample #2 has a good trough sample in it, one of the transverse troughs and one of the elongate troughs. Scooped out of both of them. They're not significantly different. Again, this sort of braided pattern, ripples. Lengthwise, they all seem to be normally about - the longate dimension, like doubly plunging anticlines, is about 4 feet. The ones I am looking at right now, about 4 or 5 feet. They are quite high, 5 to 10 centimeters, maybe. There's a perfect clapper over there, and there is something living in it, but I can't see what it is - he keeps sticking his nose out. Boy, there's a lot of living things here.

Well, I can't imagine they got the pipe out of here. This one was really buried. . .There's an enormous crab up ahead. There's a lot of life to this area. This is a little different. There's some little animal living right here in this white clapper, over to the right. I keep seeing him stick his nose out. . .Ah,

it's a little crab. There's what looks like a quahaug shell over there with a little crab living inside it. You can just see his claw. He's hiding from us as much as he can. Here is a nice salp going by. So, here we go on a northerly tour.

Oh, a huge crab on our right. Give me a little light and I'll get a good picture of him. Salp in the foreground.

We are commencing to traverse north. The water's full of salps. You can see them drifting by. Big crabs not moving anymore. You can see him right from behind the scallop shell. The scallop shell is about 2½ inches across.

Bottom sediment is fine to medium grained, sorted. Some brown flocky layer on top of it. You can see ripple crests very nicely here. Live scallops. Nice rippled topography here. I don't think you can see it though, a little too far out. A lot of sand dollars. Beautiful ripple marks. Roughly parallel to our track. There goes a scallop. . . .getting some pretty good television here. Got some lines across the top. Here's a good shot of debris. Let me just get a good colored one. That's a nice shot. All kinds of crud. This is a very big scallop shell here. Lot of shell debris. Everything in it. A little crab. Right in the ripple trough. It's a nice example, (taking pictures). Little crab right here in the foreground.

This shot has a big scallop in it, about 3½ inches across. Nice picture of a ripple crest. . .and that's the end of the roll of film. A sea anemone, just beautiful. Unique example of the anemone growing in a concave up shell. Now that is a damn good demonstration. If that anemone has grown up in that shell for that long and has never been tipped over. . . .Enormous sand dollars. Most of the sand dollars are feeding just under the surface here today. Some big red shrimp as well. See how flat it is over here. Lot of mottling. Lot of the sand dollars - brick red. This is much more of a habitat than the area we were in previously. There are all kinds of animals. The sand is quite homogeneous. Lot more life. The biologists

No echo, no pinger. Submarine at the bottom. Heavily rippled. Ripples averaging say 30 - 50 centimeters, 5 - 10 high. Very mottled pattern. White shelled debris in the troughs. An active benthic community. Very abundant hake. All kinds of sand dollars. We're in the salp zone. I've got to take a picture of the salps. There's a lot of plankton in the water here - quite concentrated. Let's see what we get for concentrations in our suspended matter sample. Those salps seem to be all down at the bottom today. . . . .Surfacing at 1123, Concluded Dive #471.

END OF TAPE

Nekton Beta Drive 472. Commencing at 1220. Surface temperature - 18.5°. Depth 40 feet - temperature 18.0°. Passing 70 feet - temperature 16.0°. (Seems a bit more turbid here) 100 feet - 13.5°. 130 feet - 7.5°. Have the lights on now. There is quite a bit of suspended material streaming past the port. Seems much more turbid. Much more suspended material, than in previous dives. Now we can see bottom. Coming up on it. And looking down you can see a very definite pattern of lines of ridges. Touched down on bottom at 194 feet. There are quite a number of what look to be Astropecten, as well as some Asterias. Quite a number of red hake.

We have a bottom temperature here of about 6.0°. There are the red caridean shrimp. They seem to be quite numerous on the bottom. Just sitting on the bottom or on top of it. Wandering around. There's a P. acadrensis. Quite a number of salps drifting by. Lot of suspended material. Large particles of organic matter. Looks like organic matter, anyway, drifting by the port.

The bottom here seems to have much more well defined ripples. But, again, we have a predominance of Echinarachnius on the crest. Quite a lot of starfish around. Quite a lot of hake. There are some Arctica clappers. Very large Cancer borealis. A pair in copula, male and female. Placopecten scattered about. As well as Asterias (forbesi), and I thought I saw some Astropecten. Very large scallop. Red hake. The crest of the ridges seem to be very brown in color.

Just cruising over the bottom, and you can see the well defined ripple patterns. They are definitely aligned. Although they are not just straight waves. Most of the valves are oriented concave side up. There are hake and Cancer. It seems very much like the first site, although not as many scallops. On closer view, it seems like there are numerous hermit crabs around. There seems to be Pagurus acadiensis (?) - very

red marks on the chelae. There seem to be some small Caprellids which are fairly large and are holding on to various fragments of worm tube tna shell, waving about on the substratum. I also saw what I thought were tentacles of a Spionid polychaete, waving up on the surface from the tube. Also there seem to be a Ampeliscid amphipod sort of swimming on its side along the surface. Just moving on the surface.

We're leaving the bottom now at 1305. Moving up through the water column. Quite a lot of salps. Now they seem to be petering out - not too many. Up about 160 feet. We're at the surface at 1307.

END OF TAPE

Joe Forns Dive #473 25 August 75

Nekton Beta, Dive #473. 1335. 25 August. Station 119. We are diving at 60 feet - temperature is 72°. 80 feet - 65° F. 100 feet - 58°. 120 feet - 52°. 140 feet - 47°. 160 feet - 46°. 180 feet - 45°. Bottom in site. On the bottom - 195 feet. Temperature 46° F.

Some small hake. Some salp chains that are associated with the bottom - approximately 2 to 3 feet off the bottom. Very small hake. There are sand dollars imbedded in the surface. Some small asterias starfish. A very lumpy terrain. Not so much ridge and swale as mounds. Some scallops going by. Some small hermit crabs here that look to be relics of argopecten. Some small shrimp again, now - several of them. The shrimp seem to be right on the bottom. Let's say, within a square foot there's maybe 3 to 5. There don't seem to be any folds or mounds from infaunal mollusks. Small hake again - approximately 6 or 7 inches. Another hake coming over.

Take some T.V. - Shoot just a few pictures with the hake.

This is what the bottom looks like. There seems to be a lumpy type bottom. There isn't a distinguishable ridge and swale topography. Most of the material is mollusks. There seem to be huge sand dollars. There are salps - they seem to be about a foot and 1/2 off the bottom.

(Moving again) We can turn the visual lights off - outside lights - and we can sneak up on stuff; because it is very clear....(Taking pictures)... Some sand dollars. Some scallops moving around. Scallops never seem to move more than 2 to 3 feet off the bottom. Characteristically, the sand dollars are always on the crests of these mounds or ridges. Why don't we try and get this plankton net...Here we go. She's free now. And I'll turn this around. I got her opened, so I can suck the mouth of that net...We'll take the net now. I've got her now. Beautiful. Can you see the net? (No.) Well, I've got her.

That's good. A hake will even jump in if we are lucky...We'll try to get all this material...Now if you can go forward ... Oops. Pushing this out is a real difficulty. Catching shrimp is not going to be easy. Got one! ... Two. Two big ones we got! Oh, they came out. The two big ones came out. We'll get the starfish though. See that scallop turn. He was sitting right in front of my net. I'm learning something good. It comes in easily. It doesn't go out as easily though. I got a couple, but I don't know if they stayed. If I get them in from the net, they should stay - the nets pretty long.

I'm going to get this hermit crab, if I can. ..Trying to go up and down with it...Now, see what happens when the light goes out. (click) I can see these guys still, and they don't move...Got an ensis that time. And a hake is coming up. There he is. No, he's too far out...Oh, I dropped.. I got it back again....He was in and then he got out...Really fast... Oops, hold up, missed again. There we go. This net is quite effective at getting sand dollars. Very soft stuff on the tops of these ridges. It's not nearly as compact...I don't know how much we've got in there already, but keep moving a while longer. That scallop - he went in the net and then came back out again. These things really get away. I can see why they are not caught. Some small flat fish seem to be on the bottom also. Hake again.

Why don't we try a really quick one down over the bottom the way we are - down close. We'll see if I can just use this as a plankton sampler. Those shrimp are actually faster than we're going now. Another big flat fish there and a ray.. Oh, I got a big scallop. I caught him. He's beautiful. He's working his way, but he's not going to get out now. ..Geez, I dropped it...I hope the scallop doesn't get away though...(Reeling in net)...

There seems to be an enormous amount of these caridean shrimps on

the bottom. They are very fast. We tried sampling with the net, and they don't seem to be able to trap at all. They get away very quickly. Even when the Nekton is going at full speed across the bottom. There seem to be quite a few anemone; and, as Dave had seen before, they're in concave upward shells. There's a few clappers there of Artica. Some crabs now. There's a skate egg case. ... (Slater - I've never seen so many salps before down here). During the day they will be down here. There are some siphonophores also - the clear ones. The little pink ones are salps. There's an artica...

This can't be as clear as you saw before, though. Because it looks as though you only have 25 or 30 feet, tops....There seems to be a lot of plankton and a lot of scattering when the lights are on. Now we are picking up a very distinguishable ripple pattern. Our bearing is 250 and we are running parallel to this ripple pattern. Very dense swarms of salps, long strings. They are probably, individually, 2 or 3 feet. They seem to be always in excess of 2 feet off the bottom, but they don't seem to be very much higher... Let me take this manipulator in now.

The current is moving fast here on the bottom...(Trying to hear pinger) Coming up on a series of features which consist of small ridges and mounds that are approximately 3 to 5 centimeters high. Inside the swells of each are numerous amounts of shell debris. Shell debris, in this case, looks like artica islandica.

If you want to put the lights on, I'll get a couple of shots of these. See the grey, like clay fractions here...See these things, they look almost like grey stones. They're clay balls, I guess. .. There's quite a few that are sticking out here. There seems to be what might be the beginnings of an outcropping. You can see small, clay fragments here. About 2 and 1/2 centimeters in size. Here's a couple that seem like 5 centimeters - a very dark grey.

We are now going away from this ridge and swale area of clay. Stone size material and getting into a more sandy bottom. Lots of shell debris. Again there seems to be quite a bit of Artica islandica shells. You see a few clappers. More scallops on the bottom. Hake is the fish that we are seeing here.

We are sitting on the bottom, and there seems like there is a current coming from the north - sliding us. Our bearing is 240 and it's sliding us sideways...Oh, a sea urchin - really nice. Very pretty. (Pinger hunting).

END OF TAPE

Nekton Beta, Dive 474, 25 August 75, 1617 hrs. The main objective of this dive is to find the pinger. We have now located it at the surface with the Zodiac. Very weak signal. No signal whatsoever on the bottom. And now I think we've got it between the two buoys that we set. Make an attempt to find it now.

There's supposed to be about 8 feet of this pipe sticking up. Preparing to dive at 1622. Commencing our descent. 20 feet - 24.5°. 40 feet - 24.2°. 60 feet - 22.5°. 80 feet - 18.0°. Descending. Slowing our descent to try to pick up the pinger. Bottom coming up. On the bottom.

I can't imagine why we are not picking that pinger up. Light is not very good down here today. Turbidity is high, and it's murky.

We are now crossing perpendicular to the ripples so we must be going either east or west. I am not sure which. Echo ranging. . .We must be getting close to something. Scallops. . . .Bottom here doesn't look as if it has quite as much shell debris. Quite a number of stars. . . .Abundant salps. Scallop just did a triple somersault on the bottom.

O.K., we are on the trail of something now. We get echo. (Slater - It must be a big object). That's the railroad wheel lying on its side, I bet. (Slater - It is the wheel). And its layed down, how about that? That's some reflector. O.K., here we are. See the wire lying around it. I bet somebody got hold of it. Dragged it and tipped it over. Look at that, will you? Look at the size of those fish! The pipe's got to be a ship's length away, somewhere - that's 180 feet. Well, we've got to photograph the hell out of this thing. Isn't that something. We've got 5 feet of pipe that's marked. We've got to get television. This is great!

I don't think they could have pulled the whole pipe out. I actually have precise locations on every one of them on the Loran-C. What a habitat. If somebody dropped his line down here he could get a few hake. . .Look at the chain wrapped around it. The problem is getting the pictures of it, you know. Somehow, I'll have

to get around the other side. Why don't we come up around ahead of it a little. We'll take some as we come around...that's pretty nice. That's good.

No evidence of sedimentation around this thing. There is an ugly looking fish looking out at me from under there. I wonder what he is. . .isn't that an amazing habitat. Some of the biggest hake I have ever seen. This post lies over on its side. I don't see any sign of scour around it. It's surrounded by hake and lobster and crabs and eel pout. There isn't any evidence of scour. It appears to have been tipped over. Pulled, probably and tipped over. You can see where it actually landed, and then appears to have tipped. So I suppose somebody got hold of it, and pulled pretty hard and dumped it. And, of course, were unable to pull it up.

O.K., we are taking shots of the pipe. . . These are good ones. . . .Boy, it doesn't take anything to bring in all these animals, does it? Remarkable. There's a wire just over to the right of us here. What's interesting is that the wire's covered up. I wonder if it hasn't been buried by the sand wave here.

TELEVISION

Nekton Beta, Dive #474; we found the railroad wheel at site 219. This is the base of it, and the railroad wheel has been turned over. It has become a superb natural habitat. Let's see how big it is. There's a lobster right at the base, which we might try to capture here shortly. . . Some shots right along the base of it.

We are now looking right down by it. A million hake here. Very large hake swimming all around it. It's an excellent habitat. We're going to move along it now. You can see the pipe laying over. Apparently, the pipe probably was tipped over.

Now, this is a good view of the end. You can see how it is dug in. There doesn't seem to be much buried at the present time, at least. This thing would make a great protection for the next pinger we put down. We ought to just bring

the pinger down in the claw. We could just sit it in here right by this thing, and then we would be well protected.

One of the biggest hake we have seen. He's a big ugly job, who sticks his nose out. . .O.K., I think that's very good coverage.

So, we find one item on the bottom and there doesn't appear to be an enormous amount of scour on it. It certainly hasn't been buried by any sand waves. O.K., I'm going to search around for a while, and see what else we can find. . .I think the ship dumped the wheels off right after they got the core; and they put the pinger right down next to the corer. . . .We might ask Dennis where our buoy is relative to the rest of the stuff up there. (Slater - I did, and he said we were exactly between the two buoys. 1/3 of the way to the red buoy). Good, it's right where I thought it would be. It ought to be close. Of course, we never found the railroad wheel at the last place. . . . .

(Traversing the bottom and still looking for the pipe). . . .(Slater - there's the pipe). Yea, good work, good work. (Slater - There's a line on it going to the surface; and the pipes bent over at a 45^{o} angle). The pipe was east of the big wheel. There's a big nylon line caught on it. We'll get some pictures of it. Can you count those rings? Slater - O.K., seven feet of pipe stick out of the bottom. That's about right. They said 14 feet would be buried. . . .I think they probably took the buoy off. This was buoyed with a Norweigan float; and the other thing had the buoy with the radar reflector and all the other stuff on it. That damn pinger shouldn't be more than 20 or 30 feet away, too.

Let's see, if you could maneuver just a little to the left, I could probably get a shot of that. . .I think a dragger got it. That's really some piece of pipe, isn't it. Of course, they might have tried to pull it up, too. Little scour around the bottom, but not much. (Trying to get pictures, but can't get a flash). Our direction again was east of the wheel; probably about 100 yards. . .We have to document this.

TELEVISION

Taking television of the pipe. The pipe has been bent over at almost a 45° angle. There is some scour around the base, but not much. About 7 feet of the pipe protruding. The rest of it is still buried. The report was that it would be buried to about 8 feet, and with about 8 feet still sticking up above. Some shells about the base. A yellow polyprop line still trailing up above, but the buoy is gone. So here at the base of the pipe, there appears to be no effect of sand wave motion. There appears to be very little scour, and what scour there is, is probably by fish swimming around the base of the pipe. . . . .

(Slater - Was there a buoy line on the other part to this one?) No, it was all gone up at the top. (Slater - Was there supposed to be one?) No, I had a wire on that one apparently. They were going to put wire on both of these, but the wire they put on the railroad wheel of this one, because that's what was laying around. . .O.K., one more shot (color) of the pipe, (click). Nope, no flash. (Black and white wouldn't flash, either). Well, damn! I got one picture of the damn pipe. I'll try a couple more time jobs here, wide open. Too much plankton moving. I don't think it will come out though, do you? Well, at least we got some T.V. on it.

Well, very good. We did it. (Slater - the Zodiac actually did it). It sure did. Well, that damn pinger lies right around here, very close to us. It's got to be very close. I wouldn't be surprised if the pinger hadn't been damanged. It's surprising that the pinger is here at all, after everything got run over. . . Held down by a chain, just like the other one was.

(Ran a thirty (30) foot circle around the pipe, with 20 foot visual, but still no pinger). Starting to surface. Well, that's good. We got two pipes. Surfacing at 1722. Conclusion of Dive #474.

END OF TAPE

Station 119 - August 25, 1975. We are on the bottom at 200 feet. The bottom is sand, with some pebbles and ripple marks.

We are heading north, at the moment, and the ripple marks seem to be east and west. There are many salps in the water. Quite a lot of scallops on the bottom - many of them small. Cancer crabs, Asterias starfish, shell debris, and a number of pieces of dead crab (carapaces) on the bottom. We have some Henricia starfish. Some of the red shrimp, and the sand itself appears as it has in the other dives - mottled brownish and greyish. There are a few sea urchins on the bottom. A few dead sand dollars. I haven't seen any live sand dollars, as yet. There are a few small sand worms here, and sand collars from polinicies. A few skate egg cases. There's some very small nudibranchs. Quite a large number of the red shrimp. Hake all over the place, as before.

At the moment, we are heading southeast and crossing some rather prominent ripple marks, perpendicularly. The ripple marks aren't all parallel. There's some confusion in their orientation. There is somewhat of an current down here, moving from east to west. There are several anemones here. There are several burroughing anemones that look quite a bit like very small Edwardsia .

In some of the valleys between the ripple marks there are chunks of grey material that look like clay . There are quite a few small hermit crabs. The shell debris is Artica, Placopecten, and many pieces too finely broken to be identified. Generally, the water here at the bottom is quite a bit more turbid than previous dives. There is a medium sized goose fish on the bottom... Very well camoflauged. There are eel pouts. . We just passed a good sized anemone. There's a few live sand dollars, mostly buried in the sand on the tops of ridges. There is a good sized skate.

Bruce Reynolds 25 August 75

We have been going along for some 45 minutes now, and seen a few large boulders. A few excavations in clay clumps by crabs. Some fairly large unadorned nudibranchs - a purplish color. Some rather large anemones, attached to old scallop shells. Large number of scallops.

There are relatively few whole dead shells. Most of the shell material is very finely broken.

THIS IS THE END OF THE DIVE.

Don Boesch Dive #476 26 August 75

0900 at Station 119...90 feet - temperature 16°. 100 feet - 14.5°. 110 feet - temp. 11.5°. 130 feet - temp. 9.5°. 140 feet - temp. 10.0°. 150 feet - temp. 10.0°. 160 feet - temp. 8.5°. 170 feet - 8.0°. 180 feet - temp. 8.0°. 190 feet - temp. 8.0°. We're on the bottom at 202 feet.

There seem to be a lot of clay lumps here; pebbles and clay lumps on the surface. This is a little deeper than the first dive, isn't it? (Slater - Yes). How much distance between the ripples is there? (Slater - Oh, about a foot). The crest is the soft sandy material and the troughs of the ripples are just a hash of shell and clay lumps. I am looking at a ripple crest area rather closely. I see very little activity. There's one of the red Caridean shrimp sitting on the surface; and I can see into the adjacent trough. I think I'll take a picture of it...I'd like to sample that clay area.

O.K. I'm closely observing the bottom after taking a sample in one of the troughs. We got some good clay and shell samples, I believe. Now the red hake are around, looking over the disturbed area. I saw one feed a little while ago on some particle coming up from the bottom. There's an Echinarachnius sitting on one of the crests. Large muscle shell with some scallop shells and large clay lumps in the trough; an awful lot of clay lumps. There seem to be small, little, a couple of centimeters across, mounds of fine material - not really mounds, more like patches of fine material. Looks like the results from bioturbation.

There's a hermit crab following right along the crest of one of the ridges. Placopecten sitting out there, but with no particular orientation with respect to the topography. There's another one sitting on the crest of a ridge. The starfish seem to be mostly in the troughs. But that's not really a hard and fast rule.

Don Boesch 26 August 75

We're moving in on a skate. Looks like a (clear nosed) skate. He's just cruising right on the bottom. In fact, he has some sediment and shell sitting right on top of him where he was burrowed in. He just stays right close to that bottom, doesn't he. Salps drifting by.

I am looking at the small scale pattern again, and there is a caprellid sitting on a small hydroid going through (pellum) waving around. Hake feeding - they just seem to take a bit of sediment in their mouths and chew it around a little bit and spit it out. Don't seem to be particle or parcel feeders - just gulp in a ration and spit out what they don't want. There's some (aechnecastons) - some burrowing worm probably. (Abacia). Another (Abacia). Scallop.

We just turned the lights out, and it seems quite dark down here; and it's now about 9:30, I guess - in the morning. It's kind of an overcast day. Visibility is kind of low. It looks pretty well worked over by starfish. We're ascending, looking at the suspended material. Again, lots of large particles. There seem to be a whole lot of ones that we can barely see. Just a tremendous concentration of salps. I would guess 4 or 5 long strands per cubic meter. And now we are just about out of them. What's the depth here? (Slater - about 190, 200). There's a big ungulating jelly fish. 190 to 200 is the concentration of salps - right near the bottom. No salps at all up here. Lots of suspended material drifting by. (Slater - 150). Looked to be a darting (copepod). It looks like some of the large (Copepods) are avoiding the sub. Some(chaetaphores), sparsely distributed ... shooting around.

...Density....depth....If you (get) a per square meter basis of a horizontal section, I would say you would see maybe 8 to 10 in that area.

Don Boesch

26 Aug 75

Passed 100 feet now. Ascending very rapidly. Barely make out small particles in the water. Jelly fish drifting down past us. Quite a bit more light up here now. Still sort of a murky situation, not really clear. Three or four more large jelly fish in sight.

We're on the surface.

Bruce Reynolds Dive #477 26 August 75

O.K. This is Bruce Reynolds again. Second dive at station 119. August 26, 1975. We are at the bottom at 200 feet. This time there are small poorly defined ripple marks. Not all parallel to each other. They consist of ridges and isolated elevations and depressions. There are a few sand dollars on top of the ridges. Broken shell material in the swales and depressions. There are small flounder. Lots of small flounder - about thumbnail size. Red shrimp again. Asterias star fish. Scallops - small scallops. Many salps in the water. There are a few large hake. The shell debris seems to consist of dead scallops, a few Ensis shells.

We just came up on the railroad wheel. There are many large hake. A few large lobsters. I'm going to take a few minutes of T.V. footage of hake around the railroad wheel here. This is quite a little community here of the hake and the lobsters. There's one immense lobster here that we are going to see if we can bring back with the manipulator arm. This is some big lobster. The manipulator arm is too small to grasp it by the carapace. I'll have to try again and grasp it by the tail. O.K. we have the lobster, more or less, and we're heading back to the surface. On this dive, in the same general area as yesterday, there's no evidence of clay outcroppings, or even clumps of clay in the troughs of the ripples. There is just sand, rather brownish, and broken shell debris, as described.

The water seems much more turbid today than yesterday. Visibility is rather poor - maybe in the order of 15 feet or so. A good many of the same species of organisms as found on the dive yesterday, are also present today: the sea urchins, the burrowing anemones, and the other benthic fauna. The scallops aren't nearly as common as yesterday. Most of them seem to be the samll ones - about 2 inches across or so. Also, some of the debris between

the ripples consists of pieces of sand dollars. Most of the dead shell material appears to be rather old, and quite broken up. This is the end of the dive.

Joe Forns Dive #478 26 August 75

26 August 75, 1105. Ships heading 060. Surface water temperature is 75.5°F - approximately 24°C. Depth 50 feet - temperature 24°. Depth 80 feet - temperature 20° C. Depth 100 feet - tmp. 16.5°C. Depth 120 feet - temperature 12°C. Depth 140 feet - temp. 9°C. Depth 160 feet - 7.5°C. Depth 180 feet - temp. 7.5°C. On the descent - seems very cloudy, quite dark, bottom in sight. Bottom 198 feet - temp. 7°C. Very cloudy. Lots of plankton, some salps on the bottom. We've got a 210°heading and we seem to be drifting parallel. The bottom, again, seems to be made up of shell debris, sandy. Sand dollars seem to be on their mounds. Very soft disaggregate material on the tops of the mounds. WE are now heading 180° toward the wheel....

We are now heading toward the railroad wheel. The bottom composition again seems to be very loosely consolidated sand - greyish clay material. It seems to be broken in relict shell debris. Small bottom fish which are indistinguishable. Very densely planktonic in this bottom water here. Not nearly as many hake as we saw in yesterday's dive. I would say, in 15 or 20 yards of travel, we have seen 4 hake. There seems to be three variety of starfish down here. There does not seem to be any siphon tubes from Artica protruding to the surface. We are coming up on the railroad wheel now, I'll take a few 35 mm photographs, and then we will go to the T.V.

Oh boy, this looks like a different target entirely. This is not the buoy. (O'Donnell - This is our buoy.) This is the red buoy with the current meter blocked onto these. Negative on the railroad wheel. Couple of hake seem to be sitting there. In fact there are 4 hake sitting there at the base of the block - approximately 6 or 7 inches long. Oh, very long (siphomedusae?) over here - approximately 1 meter off the bottom. Oh, that's a beautiful salp.

Joe Forns 26 August 75

Heading on a course of 060 - toward another target. Hopefully the railroad wheel. How is that plankton net streaming behind you. Is it O.K.? (O'Donnell - Yeh, it's fine). Very good. It's going to collect a lot of bugs, but what the hell. Very few scallops down here. I've seen 3 or 4 perhaps.

Coming now into an area that seems to have a lot of relictshell debris again. Some clappers of Artica. Some Ensis. Here's a few crabs here - Cancer. There's a nudibranch. Closing in now on the well-known buoy marker. The plankton net has broken free from the claw, and so we are dragging it amidships - so we will have quite a bit of bottom planktonic organisms in this tow....

Very large scallop, Placopecten, has made a depression and is sitting in it. The placopecten has a diameter of about 7 inches. On its surface is a lot of what seems to be hydroids a few very small hermit crabs on the shell top. These salps - the individual colony seem to have long filaments where a salp chain would be approximately 1 to 2 feet; but the filaments coming off each individual in the colony, can be as much as 7 or 8 inches. They extend and retract them in a feeding pattern.

What is all that material off to the starboard?...There's a big hake over here. There are piles of shell debris. We've got a pigeon hole on the railroad wheel now. Oh great. FANTASTIC. WOW! A LOT OF HAKE! They're just swarming on it. Several inches long... I've got some pictures. Let's get this T.V. down and we'll shoot some footage on the T.V....

O.K. Now we're shooting in that railroad wheel. You can see the density of the hake are very, very high. The animals, themselves, are probably a foot long. Quite a congregation. What you might be seeing in the right hand side of the picture is the claw up there. There's a hake right inside.

For the benefit of all those hungry icthyologists, there doesn't seem to be too many other organisms congregating around this. There's some wire we can see. There are a couple of starfish that are on the wheel itself. But there doesn't seem to be any other organism.

(Cannot make scoop with plankton net because it is hung up across top of boat.)

Ascending. ... It looks like the salps are well distributed throughout the water column today. We are at a depth of about 180 feet and rising. Now we have broken out of the salp layer.

END OF TAPE

DAve Folger Dive #479 . 26 August 75

This is dive #479. The time is 1058, 26 August 1975 - Nekton Beta. We are getting ready to try and hang the new pinger on the pipe that's been bent over on the bottom. And we will also be taking photographs of the pipe itself - still, both in color and in black and white.

Ready to commence descent. Surface water temperature today - 26.4°C. 30 feet - temperature 26.2°. 40 feet - 26.2°. 50 feet - 26.0°. 60 feet - 25.8°. 70 feet - 24.8°. 80 feet - 25.8°. 90 feet - 24.8°. 100 feet - 24.0°. Declining rapidly. 110 feet. Declining very rapidly - 17.5°. 130 feet - 10.0°. 140 feet - 9.5°. 150 feet - 9.1°. 160 feet - 8.5°. 170 feet - 10.0°. 180 feet - 9.3°. 190 feet - 8.1°. On the bottom at 200 feet - 8.0°.

Ripple crests right in this area again are about 30 to 50 centimeters apart and 6 or 7 centimeters high. General distribution of white shell debris. Very mottled bottom. Lots of sand dollars. Obviously, lots of sand dollars buried as well. Seems to be another grain of ripple marks here at this location. Our heading 030. We are now roughly parallel to the ripple crests. The observed wheel - we are now heading for it. (Slater - Well listen to that) That's <u>our</u> pinger. Some great big old white qua haug shells here....

There is a definite cross-grain to these ripple marks here. There's another set that crosses it (Slater - 045)..I'd better take a little television along here. There's a hell of a lot of things going on.

T.V.

We're taking a little television on the bottom - Dive #479 - 26 August. We're preparing to set the pinger. An abundance of life right in this area. Very strong ripple marks. Our heading is 045. We are heading NE. You can get an orientation on the ripple marks which are roughly 030° - 210° in orientation.

The wave length's 30 to 50 centimeters. The height, approximately, 5 to 7 centimeters. We ought to be getting just enough relief on those ripple marks, so that you can see them. Abundant mottling. A lot of bioturbation.

....The bottom here is medium sand. Covered by a thin floccy layer. Looks like mostly organic material. There are windrows of it; even up on the crests, concentrations of little windrows of dark colored material, overlying a lighter hue of sand. The organic coating is sort of an olive-grey. Some tiny little scallops in here too. No more than 1/4" across; if you look in detail. They seem to be able to swim just as well as the big ones.

(Checking with Advance II on location of pipe -- 060... 50 yards maximum from buoy.)

This is an area with very little evidence of ripple marks. Just mottled topography. Bioturbation is extensive. Large shells. Very large burrow pits. Cave for scallops or crabs. None of them appear to be very solid. I haven't seen any of these clay particles. Can't be too far away. I recognise an anemone we saw before. Some of the scallops are enormous. These ripples that exist are very sinuous. They don't extend very far. They're what's left, I would say, of a relict topography.

They just put us down too far away...Just passing over three little ambitbus star fish trying to open a huge qua haug. I don't think they will make it. But maybe if they make it a team effort, I don't know.

Here we are. I'll take a little T.V. while we're right here again.

Here are all the hake sitting here by the railroad wheel...Well, let's see. We got good television of the base of the pipe. We got good television of the railroad wheel. All I really lack is still photography of the pipe. I should have a lot of photography of the railroad wheel.

Right where it ought to be. Son of a gun. Well, that's our first find of this damn thing - 140 from the railroad pipe. Well, let me take a picture of that. That doesn't look like so much chain. I wonder if we could pull that one up. I'll take a picture at the base of that. .....(Slater to ADvance II - We found the pinger line.)

We'll now have some T.V. of the anchor of the pinger...Moving down to the bottom port - to see through our line and so on, that's the only problem. But that's pretty good. You can see the chain on our pinger anchor - some of it's partially buried, but not very far. Our new pinger sort of masks the view, but it's not bad. O.K. That's good. We're off.

You know what? We could just go back and hang the new pinger on the old pinger....(Traversing to find pipe in which to place new pinger)

What's your heading now? ... Hey here's that dead lobster...(Back at railroad wheel). (Slater - You could stick it in that little hole right there, but I'm afraid you wouldn't be able to hear it.) Shoot. Let's see. The other option is to go back and hook it on to the old cable up there and see if that 7 lb. float will hold it up. If it sunk it, it would be bad, but if it didn't, it would be alright. Maybe we could set it right down in the loop there. We could set it right in the middle of it...It wasn't more than 50 yards was it?

It seems to me that we went around the pipe, then took off. I think this is the way we took off....(There's a sub track. I don't know if it is the one we just went on or... - Slater). Here's another dead lobster, or the one we just went by. ... Well, damn it. They're supposed to be in line, the way they were dropped.

(Slater - Oops I'm getting an echo. Good echo). What heading are we on now. (Slater - 120). We are on a heading of 120 from the pinger. The

pinger was at 140 from the railroad wheel; and now we are headed 120 from the pinger, after another echo.

(Advance II - What's your status?) (Slater - We found the buoy and the pinger, but we can't find the pipe, now.)

Got anything. (Slater - No. I'm going back to the wheel.) Let's go from the wheel just a little bit out in the same direction that the pipe is pointing on the wheel, and see if we can hear anything. We must have gotten an echo off it yesterday, or there would have been no reason to go the way we did....

(Slater - asking for direction of pipe from tape transcription)

I could have sworn it was to the east. But we've made two trips out to the east, and neither one of them found it. Maybe we should go a little more to the northeast --Slater.

Without an orientation though, it was northwest/southeast. The way they laid them down....(Slater - I can hear that chain and I can hear that wheel. ...I'm hearing 3 echo's now. Loud one in the front of me to the south - that will be the wheel. Faint one in the middle; and then a fairly loud one just to my left east...(Slater - It's that damn chain again.)

Heading 150 from the pinger. Well, if that's right..that would be right on. Because we went from the railroad wheel on 140 to the pinger....(Slater - Maybe we just didn't go far enough.

Well, all we can do is hang it on that (chain). Shoot. That's too bad. (Still can't find it)/ Isn't that funny, yesterday, we couldn't even hear the chain, now all we can get is the chain. (Slater - Do you mean chain or wheel) I think I would rather put it on this thing, if it's got a couple of floats. This cable is on and it's pretty good.The way we've got it rigged, we could just hang it right up above. If we could get it on the line right up above,the pinger that's on there now would hang down below it.

O.K. We finally got the pinger snapped on just below the old pinger right on the buoy. It seemed to be floating just right. Looked good. It's about 15 feet off the bottom....

END OF TAPE